REMARKS

In order to highlight the important structural differences from the cited references, Applicant proposes to insert the term "axially" into both main apparatus claim 9 and main method claim 27, and respectfully requests reconsideration of the art rejections. Applicant believes this appropriately responds to the Examiner's comments on the bottom of page 7 of the Final Rejection. This amendment is necessary, and could not have been presented earlier because Applicant could not have foreseen that the Examiner would not be persuaded by the previous amendment & arguments. The feature now emphasized was **previously argued**, so entry of the proposed amendment **would not require further search** or excessive review time.

ANTICIPATION REJECTION OF CLAIMS 9-10, 13-14 & 17

Claim 9 was rejected over HSIEH (U.S.P. 5,562,347).

According to main apparatus claim 9, the electric motor structure 20 of the present invention comprises a stator assembly and an external rotor assembly **that are adapted to be rapidly mated together**. The stator assembly includes a bearing support tube 70 that is formed with an opening 78 that faces a rotor cup 24 of the rotor assembly to receive a central shaft 28 thereof. The central shaft 28 of the rotor assembly is coupled to the rotor cup 24 and has a proximal end 26 adjacent to the rotor cup 24 and a distal end 34 provided with an enlargement 32.

As shown in FIG. 2, the rotor assembly includes a variety of components that are pre-mounted onto the shaft 28 prior to the assembly of the electric motor 20, as indicated in the fifth paragraph on page 4 of the specification. This also becomes clear from the last paragraph on page 6 of the specification, where it is mentioned that the "*… shaft 28 of rotor 22, with rolling bearings 52, 60 located thereon, is*

introduced […] into inner recess 78 […] of bearing support tube 90.”. Thereby, radial outer surfaces of the bearings are engaged by longitudinal ribs 80 in an inner opening 78 of the bearing support tube 70.

In one embodiment, a plurality of bearings 52, 60 is mounted on the shaft 28, whereby the shaft 28 is axially displaceable with respect to the bearings 52, 60. The plurality of bearings comprises a proximal bearing 52 and a distal bearing 60, wherein the proximal bearing 52 is arranged closer to the rotor cup 24 than the distal bearing 60. Between the proximal bearing 52 and the distal bearing 60, a predetermined distance is defined by a spacer 58 which is displaceably guided on the shaft 28. This is described by the second paragraph on page 5 of the specification, where it is mentioned that *“…a spacer 58, […] is guided displaceably on shaft 28 by means of a radially inwardly protruding projection 59,…”.*

Between the rotor cup 24 and the proximal bearing 52, a retaining member 50 is arranged that serves to immobilize at least the proximal bearing 52 in its position in the bearing support tube 70 after assembly of the electric motor 20. To this end, the retaining member 50 *“… is displaced in bearing support tube 70 in the distal direction, i. e. downward, and digs into the material of the bearing support tube 70…”* (cp. the third paragraph on page 7 of the specification) such that the retaining member 50 is fixedly located in the bearing support tube 70 and cannot be displaced in the direction of the rotor cup 24 afterwards.

Between the proximal bearing 52 and the rotor cup 24, a spring member 48 is arranged which is effective between the proximal bearing 52 and the rotor cup 24 and pushes the rotor cup 24 away from the proximal bearing 52 in order to push an enlargement 32 provided on the shaft 28 in the direction of

the distal end of the distal bearing 60. This is described by the last paragraph on page 7 of the specification, where it is mentioned that *"After the pressing-in operation is complete, […] spring 48 again presses shaft 28 upward in the proximal direction until snap ring 32 is again in contact against inner ring 64 of distal rolling bearing 60."*.

However, according to the first paragraph on page 5 of the specification, the spring 48 *". . . preferably is not in contact against this retaining member 50."*. Instead, the *"…distal end of spring 48 is in contact against the proximal end of inner ring 56 [of the proximal bearing 52]."* (see the second paragraph on page 5 of the specification).

It should be noted that the external rotor assembly is **pre-mounted separately from the stator assembly.** More specifically, mounting of the external rotor assembly is described on pages 4 and 5 of the specification with reference to FIG. 2. Accordingly, spring member 48, retaining member 50, bearing 52, spacer 58, bearing 60 and enlargement 32 are sequentially mounted on shaft 28 which is coupled to rotor cup 24 to build the external rotor assembly. The shaft 28 of the external rotor assembly having the above mentioned components pre-installed thereon is then inserted into the bearing support tube 70 of the pre-mounted stator assembly. Mounting of the stator assembly is described on page 6 of the specification with reference to FIG. 5.

Use of two separately mounted assemblies, i. e., the external rotor assembly and the stator assembly that are combined to form the inventive electric motor 20 of claim 9 is described on pages 6 and 7 of the specification with reference to FIG. 6 and is clear from the claim language of pending independent claim 9. There, it is mentioned that *"… a stator assembly (70, 80, 90) and an external rotor assembly (22, 24, 28, 52, 60) [are] adapted to be rapidly mated together;"*,

wherein *"…a plurality of bearings* (52, *60) […] are mounted on said shaft [of the external rotor assembly] for insertion into the bearing support tube (70) [of the stator assembly],…"*.

Accordingly, an efficient and rapid technique for providing a pre-mounted stator assembly and a pre-mounted external rotor assembly which are adapted to be rapidly mated together is provided. A further **major advantage** is the possibility to have the distal end 82 of the bearing support tube 70 closed from the beginning, so that no dust or water can enter through the distal end, and no lubricating oil can escape.

2. SUBJECT-MATTER OF HSIEH:

HSIEH describes a bearing system for a brushless direct current fan having a plurality of components. As illustrated in FIG. 1 of HSIEH, the plurality of components includes a bearing pedestal 20, an annular circuit board 40, a lamination 42, a ring cushion 58, two bearings 44, 46, a sleeve 60, two washers 48, 49, a rotor 50, a shaft 52, a spring 56 and a C clip 59.

The sleeve 60 includes a plurality of slots 62, a plurality of flanges 68 radially protruding from edges of the upper end of the sleeve 60 and a plurality of feet 70 radially protruding from the bracket edges of the lower end of the sleeve 60. According to column 2, lines 37 to 49 of HSIEH, the bearing pedestal 20 includes a plate 22, a base tube 26, an intermediate tube 28 and an upper tube 32. The intermediate tube 28 includes a plurality of tongues 36 which radially protrude from an inner wall of the intermediate wall 28.

According to column 3, lines 19 to 37 of HSIEH, the fan is assembled by placing the annular circuit board 40 onto the bearing pedestal 20, securing the lamination 42 on the bearing pedestal 20 and placing the ring cushion 58 on the lamination 42. Then, the slots 62 of the sleeve 60 are aligned with the

tongues 36 within the inner wall of the intermediate tube 28 in order to insert the sleeve 60 into the bearing pedestal 20 such that the feet 70 engage with the plate 22 of the pedestal 20. As illustrated in FIG. 2 and described in column 2, line 65 to column 3, line 2, the tongues 36 of the intermediate tube 28 thereby protrude from an inner wall of the sleeve 60, as the sleeve 60 has a wall thickness smaller than a height of the tongues 36.

It should be noted that the sleeve 60 is thereby tightly received within the bearing pedestal 20, as described in column 3, lines 8 to 18 of HSIEH.

Then, after having inserted the sleeve 60 into the bearing pedestal 20, the bearing 44, the washer 48 and the spring 56 are placed into the sleeve from the upper side, and then the bearing 46 and the washer 49 are placed into the sleeve from the lower side such that according to column 3, lines 38 - 42, the *"… bearings 44, 46 are separated by the tongues 36."*. In order to insert the bearing 46 and the washer 49 from the lower side into the pedestal 20, the pedestal 20 and the sleeve 60 have to be open on the downside (contrary to the present structure, where tube 70 is closed at the bottom).

It should be noted that according to column 4, lines 1 to 4 of HSIEH, the sleeve 60, which is tightly received within the pedestal 20 as described above, is tightly engaged with the bearing pedestal 20 by inserting the ball bearings 44, 46 within the sleeve 60, whereby the sleeve 60 is slightly expanded.

Only after all components of the fan except the shaft 52 with the rotor 50 have been assembled as described above, the shaft 52 with the rotor 50 is mounted onto the system, the shaft 52 being fixed using the C clip 59. Thereby, the bearings 44, 46 are pressed against the tongues 36 by the interaction of the spring 56 and the C clip 59 as described in column 3, line 42 to column 4, line 1, where it is mentioned

that the "… *bearings 44, 46 are […] secured by a combination of the washers 48, 49, the spring 56, and the C clip 59 thereby holding the shaft 52 in place.*".

3. Differences between HSIEH and pending independent claim 9:

As can be seen from the above description of HSIEH, the brushless direct current fan of HSIEH does not describe a pre-mounted external rotor assembly having a rotor cup coupled to a central shaft, a plurality of bearings which are mounted on the shaft, a retaining member arranged between the rotor cup and a first bearing of the plurality of bearings, a spring member that is effective between the first bearing and the rotor cup, and an axially displaceable spacer that is arranged between the first bearing and a second bearing, whereby the external rotor assembly is adapted to be rapidly mated to a pre-mounted stator assembly.

As was noted above, pre-mounting of the external rotor assembly and separate pre-mounting of the stator assembly is described in pending claim 9 using the language "… *a plurality of bearings* (52, *60) […] are mounted on said shaft [of the external rotor assembly] for insertion into the bearing support tube (70) [of the stator assembly],…*". Furthermore, note that the pre-mounting of the external rotor assembly is also clearly indicated in pending independent method claim 27.

In other words, HSIEH does not describe pre-mounted rotor and/or stator assemblies that can be combined to the brushless direct current fan of HSIEH. Instead, HSIEH merely describes a plurality of components that are assembled to a brushless direct current fan as described above.

Moreover, the bearing system of HSIEH does not describe a plurality of bearings which are mounted on a shaft for insertion into a bearing support tube. It is clear from pending independent claim 9 that the bearings are mounted onto the shaft of the rotor prior to inserting the shaft together with the bearings into the bearing support tube. However, according to HSIEH the bearings 44, 46 are inserted into the sleeve 60 - which was previously inserted into the bearing pedestal 20 - prior to inserting, as final assembling step, the shaft 52 into the mounted arrangement.

In particular, in the bearing system described by HSIEH, the bearings 44, 46 cannot be pre-mounted onto the shaft 52 for insertion into the sleeve 60 inside the bearing pedestal 20, as the protruding tongues 36 inside the bearing pedestal 20 would not allow to insert the bearings 44, 46 mounted on the shaft 52 into the sleeve 60 as shown in FIG. 2 of HSIEH. Therefore, the pedestal 20 and the sleeve 60 have to be open on the lower side.

Furthermore, HSIEH does not describe a retaining member arranged between the rotor cup and the proximal bearing that serves to immobilize at least the proximal bearing in its position in the bearing support tube. Instead, according to HSIEH the washer 48 merely has the function of separating the bearing 44 from the spring 56, so that the spring 56 cannot cause any damage to the bearing 44 while the spring is being compressed. But the washer 48 is not adapted and, thus, not able to retain the bearing 44 in its position in the sleeve 60. Instead, the washer 48 is retained and immobilized in its position on the bearing 44 in the sleeve 60 by the depression of the spring 56. The bearing 44, however, is retained in its position in the sleeve 60 by pressing the bearing 44 into the sleeve 60 that is thereby slightly expanded and tightly engaged with the bearing pedestal 20, cp. lines 1 to 4 in column 4 of HSIEH.

Finally, HSIEH does not describe a spacer which is axially displaceably arranged in the bearing support tube. Instead, HSIEH describes a spacer, i.e., tongues 36, which is fixedly arranged in the sleeve 60 by introducing the sleeve 60 into the bearing pedestal 20. However, it is clear that the tongues 36 are not displaceable in the bearing pedestal 20 and the sleeve 60 after assembly of all components as described above. Tongues 36 abut directly against shoulders of slots 62.

4. The rejection of pending independent claim 9 as being anticipated by HSIEH:

The Office rejects pending independent claim 9 as being anticipated by HSIEH. Specifically, the Office has alleged that HSIEH describes all elements of pending claim 9.

Applicant cannot agree with this interpretation.

As was noted above, HSIEH does not describe separately pre-mounted rotor and stator assemblies. Specifically, HSIEH does not teach or suggest a pre-mounted external rotor assembly having a rotor cup coupled to a central shaft, a plurality of bearings which are mounted on the shaft, a retaining member arranged between the rotor cup and a first bearing of the plurality of bearings, a spring member that is effective between the first bearing and the rotor cup, and a spacer that is axially displaceably arranged between the first bearing and a second bearing, whereby the external rotor assembly is adapted to be rapidly mated to a pre-mounted stator assembly.

Furthermore, HSIEH does not teach or suggest a plurality of bearings which are mounted on a shaft for insertion into a bearing support tube.

Moreover, HSIEH does not teach or suggest a retaining member arranged between the rotor cup and the proximal bearing that serves to immobilize at least the proximal bearing in its

position in the bearing support tube.

Moreover, HSIEH does not teach or suggest a spacer which is axially displaceably arranged in the bearing support tube.

Accordingly, pending independent claim 9 is clearly new and inventive over HSIEH.

With respect to the contention that "… *vibrations will inherently be produced by the operation of the machine leading to portions of the bearing tube and the spacer being displaced with respect to one another…]* , it should be noted that this opinion is **technically wrong** and is based upon an inaccurate interpretation of HSIEH's teaching, as explained below.

The Final Rejection indicates that *"Even though some portions of the bearing tube (those portions in direct contact with the bearings) may be disclosed as being tightly received within the pedestal of HSIEH, there are also portions of the bearing tube that lack such an engagement with the pedestal."*. This is apparently based on the Office's interpretation of lines 1 to 4 of column 4 of HSIEH, where it is stated that *"As the ball bearings 44, 46 are inserted within the sleeve 60, the sleeve is slightly expanded so that the sleeve 60 is tightly engaged with the bearing pedestal 20."*.

However, it should be noted that this statement clearly indicates that the sleeve 60 is tightly engaged with the bearing pedestal 20, and not only specific parts thereof. Furthermore, from FIGs. 1 and 2 of HSIEH, one can clearly see that the lower side of the bearing 44 is in contact with the upper side of tongues 36, and the upper side of bearing 46 is in contact with the lower side of tongues 36, which are used to define a pre-determined space between both bearings 44, 46. The bearings 44, 46, tightly engage the sleeve 60 within the bearing pedestal 20, and are, thus, not axially displaceable with respect to the bearing pedestal 20 and/or the sleeve 60.

Thus, **even if** the sleeve 60 were only tightly engaged with the bearing pedestal 20 at the portions where the sleeve 60 is in contact with the bearings 44, 46, the tongues 36 would not be axially displaceable within the sleeve 60 and/or the bearing pedestal 20 after insertion of the bearings 44, 46 into the sleeve 60 that is mounted on the bearing pedestal 20, as displacement of the tongues 36 is clearly inhibited by the bearings 44, 46, which tightly engage the sleeve 60 within the bearing pedestal 20.

Therefore, Applicant respectfully disagrees with the contention expressed in the Final Rejection, which is technically inaccurate and clearly based on an unpermitted hindsight. This is even more unacceptable since the Office interprets teachings of HSIEH incorrectly, and contrary to statements included in HSIEH.

Main apparatus claim 9 is in condition for allowance. Since pending claims 10 to 26 are dependent upon claim 9, these claims should also be considered allowable.

The above arguments also apply to the features of pending **method** claims 27 and 28, directed to a highly efficient method of assembling a motor. Page 5 of the Final Rejection cited In re Burhans, 69 USPQ 33 (1946), for the proposition that "in the absence of new or unexpected results" the "selection of any order of performing process steps is *prima facie obvious*." Burhans was a case about the process steps *for making whole wheat bread*, i.e. a recipe, and its relevance to assembly of complicated mechanical devices is questionable. The present specification explains, in some detail, how the structure and method of the present invention allow **previously-manual** steps to be **automated**, minimize the incidence of damage to bearings (thereby improving yield), and keep dirt and "gunk" out of the bearings (thereby improving service lifetime of the finished product). Since nobody taught how to accomplish this before,

one can reasonably characterize these improvements as "unexpected results."

Applying the BURHANS doctrine indiscriminately would lead one to the **erroneous conclusion** that NASA's procedures, for example, are obvious because they put astronauts into space, an expected and intended result. We all know, from unhappy experience, that "the devil is in the details" and that some misplaced foam fragments can result in astronauts **burned alive** upon re-entry into the atmosphere. Much of modern technology, from obstetrical methods to manufacturing, is of benefit to mankind (and womankind) because it succeeds in reaching a desired result **safely**, **consistently**, and at an acceptable **economic cost**. This should not be lightly disparaged.

CLAIM REJECTIONS--SECTION 103

Claims 11-12, 15-16 & 27-28 were rejected, based upon a proposed combination of features of HSIEH and STONE.

STONE (USP 3,728,563) discloses a somewhat antiquated (circa-1971) motor structure with two self-adjusting bearings 62, 64 (col. 3, line 50 & col. 4, line 6) These bearings 62, 64 have a semi-spherical outer surface; see col. 4, lines 13-14.

In order for bearings 62, 64 to adjust themselves, they are placed inside a tube 66 which is subjected to a magnetic-pulse-deformation treatment to create a semi-spherical seat 65 for bearing 62 and a semi-spherical seat 67 for bearing 64. These seats hold bearings 62, 64 at a desired distance from each other; see col. 3, lines 25-32 and 51-57, and col. 4, lines 12-14. Between bearings 62, 64, there is provided a felt body 86, impregnated with oil, which provides lubrication to bearings 62, 64. Thus was the way lubrication was provided in that era, as described at col. 3, line 65, through col. 4, line 1. Felt body 86 has no mechanical or load-bearing function and thus fails to define any "predetermined distance

between the proximal bearing and the distal bearing" as recited in main claim 9. In STONE, tube 66 alone defines the distance between bearings 62 and 64. Neither STONE nor HSIEH, nor any combination thereof, would suggest the structure recited in claims 11-12, 15-16 or 27-28. Furthermore, there is nothing in the circa-1971 STONE disclosure or in the circa-1995 HSIEH disclosure to motivate an attempt to combine those structures. Both the STONE and HSIEH structures are complicated and require considerable time (i.e. labor cost) to assemble, while by contrast the presently claimed structure is comparatively simple, and quick to assemble, and readily lends itself to automated assembly techniques, as stated at specification page 2, lines 6-7. Reconsideration, and withdrawal, of the section 103 rejections are solicited.

WROBEL (USP 4,613,778) was cited, on the top of page 7 of the Final Rejection, against claims 20-21 and 24-25. WROBEL (now expired) was assigned to Papst-Motoren, which was the former name of ebm-papst St. Georgen GmbH & Co. KG, the assignee of the present invention. The assignee respectfully suggests that, if WROBEL actually taught the subject-matter of the present claims, ebm-papst could have saved itself a lot of R & D investment. In fact, WROBEL has only an incidental similarity to the subject-matter of claims 20-21 and 24-25, and does not suggest the structure that makes possible today's highly automated motor assembly procedures.

Although, as correctly noted by the Examiner, the references show **individual bits and pieces** of the structure recited in the present claims, none of the references provide any motivation to combine the pieces in the manner suggested by the Office, nor would such a combination result in the structure recited in the claims, as amended.

"The mere fact that the prior art could be so modified would not have made the modification obvious, unless the prior art suggested the desirability of the modification."

In re Gordon, 733 F.2d 900, 902; 221 USPQ 1125, 1127 (Fed. Cir. 1984). A "rote invocation" of the high level of skill in the art does not provide the necessary motivation to combine the teachings of the prior art to render a claimed invention obvious. In re Rouffet, 47 USPQ2d 1453 (Fed. Cir. 1998).
In re McLaughlin, 170 USPQ 209 (CCPA 1971).
In re Wright, 193 USPQ 332 (CCPA 1977)
In re Geiger, 2 USPQ 2d 1276 (Fed. Cir. 1987).
In re Stencel, 4 USPQ 2d 1071 (Fed. Cir. 1987)
In re Fine, 5 USPQ 2d 1596 (Fed. Cir. 1988).
In re Jones, 21 USPQ 2d 1941 (Fed. Cir. 1992).
In re Van Geuns, 26 USPQ 2d 1057 (Fed. Cir. 1993).
"To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that, which only the inventor taught, is used against its teacher." W.L. Gore, 721 F.2d at 1593, 220 USPQ at 312-313.

The Federal Circuit noted in Ruiz v. A.B. Chance Co., 234 F.3rd 654, 57 USPQ 2d 1161 (2000) that "In order to prevent a hindsight-based obviousness analysis, we have clearly established that the relevant inquiry for determining the scope and content of the prior art is whether there is a reason, suggestion or motivation in the prior art or elsewhere that would have led one of ordinary skill in the art to combine the references." See also In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) and In re Paulsen, 30 F.3d 1475, 31 USPQ2d 1671 (Fed. Cir. 1994).

5. Conclusion

Main apparatus claim 9, main method claim 27, and their respective dependent claims 10-26 and 28, are now clear, and patentably distinguish over HSIEH, STONE, WROBEL, and the other art of record, taken singly or in combination.

If the Examiner detects any other informalities or wishes to make any suggestions to place the application in condition for allowance, a telephone call to the undersigned is requested, for prompt resolution thereof.

A two-month extension fee is being submitted herewith. if any additional fee is required, it may be charged to Deposit Account No. 23-0442.

Respectfully submitted,

/Milton Oliver, Reg. # 28,333/

Milton Oliver
Attorney for Applicant
WARE, FRESSOLA, VAN DER SLUYS
& ADOLPHSON, LLP
755 Main Street
P.O. BOX 224
MONROE, CT 06468-0224
TEL: 203-261-1234
FAX: 203-261-5676
EMAIL: miltonoliver@ieee.org

F:\WP51\MMO\AMEND\8703-177.AM3